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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,303	12/28/2001	Frank Hawley	ACT-307DVA	2755

7590 07/01/2003
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EXAMINER

MAI, ANH D

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 07/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

10/036,303

Applicant(s)

HAWLEY ET AL.

Examiner

Anh D. Mai

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-- The MAILING DATE of this communicati n appears on th cover sheet with the corresp ndence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 March 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Status of the Claims

1. Amendment filed May 27, 2003 has been entered as Paper No. 7. Claims 5-10 are pending.

Declaration

2. Declaration filed May 27, 2003 has been considered. However, the issue at hand (annular trench) does not found support in the originally filed specification.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “a single isolation trench having uniform-cross section” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Response to Amendment

4. The amendment filed August 28, 2002 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: “forming a single isolation trench having a uniform cross-section to define an active region”; “an **annular trench**” (paragraph 18); “shown in Fig. 3 as well as the sidewalls of the front and rear portions of the trench lying outside of the

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plane of Fig. 3” (paragraph 19); “**annular isolation trench 62...isolation trench 62 is**” (paragraph 22); “**isolation trench 62**” (paragraph 23) “**trench 62**” (paragraph 25) and “**isolation trench 62**” (paragraph 26).

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 5-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 5 recites: forming a **single** isolation trench **having a uniform cross-section** to define an active region.

How a **single trench** is formed to define an active region ? This does not appear to be possible.

6. Claims 5-10 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which **was not described in the specification** in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), **at the time the application was filed**, had possession of the claimed invention.

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There does not appear to be a written description of the claim limitation “forming a single isolation trench having a uniform cross-section to define an active region” nor “annular trench” in the application as filed.

Note that, through out the specification, the isolation is disclosed as “**isolation trenches 62**” and the active region is defined by, two, more than one isolation trenches 62.

The specification does not support any trench “having uniform cross-section” nor trenches 62” are annular trench.

Be advise, to resolve this problem, applicant is advised to file a C-I-P (continuation-in-part) so that **new matters** can be entered.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 5-10 are further rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

“a single trench” can not define anything, thus, indefinite.

To define an area, such as an active region, the area should be bound by at least two, for 2 dimensions, markers, in this instant, two trenches.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 5-7 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Mehta et al. (U.S. Patent No. 5,646,063), of record.

With respect to claim 5, as best understood by the examiner, Mehta teaches method for fabricating a shallow-trench isolation transistor on a semiconductor substrate as claimed including:

forming an isolation trench (44) to define an active region (38) in the silicon substrate (14);

performing sidewall isolation implants on the side and bottom walls of the isolation trench (44);

depositing a dielectric isolation material (60) in the isolation trench (44);
planarizing the top surface of the silicon substrate(14) and the dielectric isolation material (60);

forming a gate oxide layer (135) over the active region (38) in the silicon substrate (14);
forming and defining gate (108) regions over the gate oxide layer (135) in the active region (38) in the silicon substrate (14); and

forming source and drain regions (112/114) in the active region (38) in the silicon substrate (14). (See Figs. 2-9).

Note that, the trench (44) of Mehta having uniform cross section.

With respect to claim 6, as best understood by the examiner, the sidewall implantation of Mehta comprises implanting p-type impurities.

With respect to claim 7, as best understood by the examiner, implanting p-type impurities of Mehta comprises implanting boron.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehta '063 as applied to claims 5 and 6 above, and further in view of Liaw et al. (U.S. Patent No. 5,960,276), of record.

With respect to claim 8, Mehta teaches implanting boron ions into the bottom and side walls of the isolation trench.

Thus, Mehta is shown to teach all the features of the claim with the exception of disclosing the concentration of the dopant.

However, Liaw teaches implanting boron into the side and bottom walls of the isolation trench at a concentration within the order of magnitude as claimed (E12).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to implanting boron into the isolation trench (44) of Mehta at the concentration as taught by Liaw to reduce the reverse narrow width effect in the NMOS areas. (See col. 2, lines 2-18).

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With respect to claims 9 and 10, Mehta teaches implanting ions into side and bottom walls of the isolation trench. To implant dopants into side and bottom walls of a trench, it is well known in the art that the implantation should be performed at angles.

Thus, Mehta is shown to teach all the features of the claim with the exception of explicitly disclosing the angle of the implantation.

However, Liaw teaches implanting ions into the side walls of the isolation trench at angle that includes the claimed range.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to performed the side walls implantation of Mehta at the angle as taught by Liaw to implant dopant into side walls. This is a common knowledge in the art.

Response to Arguments

10. Applicant's arguments filed May 27, 2003 have been fully considered but they are not persuasive.

Applicant argues: "Applicant is responding again with another affidavit testifying to the fact that in order to be an isolation trench, the **trench must completely surround the device and therefore, the trench can only be a single isolation trench**. In other word, without a trench completely surrounding the device, there would be no isolation".

The argument appears to be self-centered. Applicant should provide support for his conclusion "without a trench completely surrounding the device, there would be no isolation".

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And contrary to the Applicant's conclusion that "no new matter has been added", any amendment that alters the scope of the invention, thus, new matter has been added.

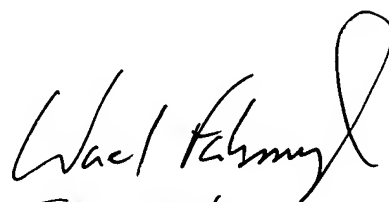
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (703) 305-0575. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A.M
June 24, 2003


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